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ABSTRACT

Two markedness hypotheses in current language acquisition theory are examined. One view of markedness, the developmental hypothesis, states that the unmarked case is the child's initial hypothesis, i.e., the hypothesis that is set in advance of linguistic data. The developmental hypothesis further predicts that children will proceed in a fixed progression from unmarked to marked structures. The learnability conception of markedness states that the child acquires the unmarked form in the absence of evidence to the contrary, and that there is not necessarily a fixed sequence from unmarked to marked; it is neutral with respect to real-time acquisition. An experiment on the acquisition of pied-piping (generally considered unmarked) and preposition stranding (considered marked) that tests these hypotheses had as subjects 33 preschool children and used comprehension and production tasks. The results indicate that the developmental claim can not be supported because the children seem to have both structures in their grammars, with stranding firmly established, suggesting that markedness may not necessarily be indicative of the order in which certain constructions emerge. It also suggests that the learnability hypothesis can account for the findings. (MSE)

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ABSTRACT

This paper will focus on two markedness hypotheses in current acquisition theory. The developmental claim about markedness states that the child's initial hypothesis is the unmarked case (Williams, 1981) and it predicts that children will proceed in a fixed progression from unmarked to marked structures. The learnability conception of markedness states that the child acquires the unmarked form in the absence of evidence to the contrary (Chomsky, 1981b). According to this hypothesis there is not necessarily a fixed sequence from unmarked to marked; it is neutral with respect to real-time acquisition.

This paper presents the results of an experiment conducted on the acquisition of pied-piping and preposition stranding. In the syntactic literature pied-piping is generally considered unmarked and stranding marked. The results indicate that the developmental claim cannot be supported for the children seem to have both structures in their grammars, with stranding firmly established. This suggests that markedness may not necessarily be indicative of the order in which certain constructions emerge. It also suggests that the learnability hypothesis can account for the data.

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Markedness and the Acquisition of Pied-piping and Preposition Stranding*

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1. Introduction

One of the central goals of generative linguistics has been to provide an explanation as to how it is possible for children to acquire language. Chomsky (1955, 1965) has proposed that humans are innately endowed with a Language Acquisition Device - represented as the theory of Universal Grammar. The theory of UG consists of universal rules and principles which guide the child in the language acquisition task. That is, the way in which children unconsciously hypothesize about language is highly constrained.

In recent literature Chomsky (1981) and Chomsky and Lasnik (1977) have outlined a theory of Core Grammer:

> "When the parameters of UG are fixed in one of the permitted ways, a particular grammar is determined, what I will call a 'core grammar'... Experience - in part, a construct based on internal state given or already attained - serves to fix the parameters of UG, providing a core grammar..." (Chomsky, 1981, p. 7).

When UG interacts with input data, a core grammar results. The structure of the Core Grammar is determined by fixing the open parameters of UG and the child's task is to select the appropriate parameters which are relevant in the language which he is exposed to. It is generally assumed that a theory of markedness is incorporated in Core Grammar or provides an extension to a periphery of more idiosyncratic language-specific rules. Whatever belongs to the core is usually unmarked. For example, the general movement rule 'move alpha' is a core rule, where alpha represents any major category. This unmarked rule permits movement of NP and +WH elements (amongst other things), and universal principles constrain its application. The peripheral grammar contains such things as inventions, borrowings, stylistic and language-specific phenonmenon, as well as marked rules. This paper will presuppose the Core Grammar framework and two views of markedness which have been put forth in this framework will be discussed, as well as how they relate to language acquisition.

These two views of markedness have certain implications for the way in which children acquire unmarked and marked constructions. The aim of this paper is to discuss which of these two markedness hypotheses (if either) is able to account for data which was collected in an experiment on the acquisition

of pied-piping and preposition stranding in the grammars of young children. One view, which will be called the "developmental hypothesis", not only assumes that the unmarked structure is the child's initial hypothesis: the hypothesis which is set in advance of linguistic data, but combines this with an assumption that this will have developmental implications, in that an unmarked structure is adopted as an initial stage by the child even if there is evidence that this unmarked structure is not present or not the only form in the linguistic input (Hyams, 1983a, 1983b). The developmental hypothesis assumes that proceeding developmentally from unmarked to marked necessarily involves a real-time progression. When the input contains only marked forms or both unmarked and marked forms, this hypothesis predicts that the child will initially ignore evidence of the marked structure, even if that marked structure is common or frequent.

The second conception of markedness which will be called the "learnability hypothesis" involves a weaker claim for acquisition in that it does not necessarily imply that children should proceed in an unmarked to marked sequence. Chomsky (1981) states that unmarked options are selected in the absence of evidence to the contrary. The marked option is selected on the basis of specific evidence. Unlike the developmental hypothesis, the learnability view does not necessarily make any assumptions concerning real-time acquisition since it says nothing about when marked forms will be noticed by the child. In other words, given evidence of a marked structure, the child might adopt that structure without having gone through a preceeding stage of assuming an unmarked form. This view is consistent with the

child acquiring marked options immediately; in addition where the input contains both unmarked and marked structures, it could allow for the simultaneous realization of these two structures.

2. Markedness Hypotheses and Acquisition

In recent syntactic literature, it is generally agreed that stranding is a marked phenonmenon (Van Riemsdijk, 1978; Hornstein and Weinberg, 1981; but cf. Stowell, 1982, for contrary claims). Stranding results when a WH element has moved out of a prepositional phrase to the front of the sentence, leaving the preposition behind. Examples of stranding are given in (1).

1a Which briefcase did John put the book in?
b. Which river did Sandra swim across?
c. Which table did the dog hide under?

Pied-piping, on the other hand, is unmarked and results when the entire prepositional phrase has moved to the front of the sentence, as in (2) below.

2a. In which briefcase did John put the book?
b. Across which river did Sandra swim?
c. Under which table did the dog hide?

Given the claim that pied-piping is unmarked and stranding marked, then according to the developmental hypothesis, pied-piping should emerge before stranding in the grammars of young children learning English, since pied-piping, as an unmarked structure, is the child's hypothesis which is set in advance of data. The developmental hypothesis assumes that the

child should initially persist with this structure, even if the input contains evidence of stranding; at some later point stranding will be adopted. On the other hand, the learnability hypothesis does not necessarily imply such a fixed sequence. This view is neutral wih respect to real-time acquisition. Since both pied-piping and stranding are in the input available to children acquiring English, then the learnability hypothesis could be consistent with the simultaneous emergence of these two structures. It could allow for the possibility that the child will "notice" marked constructions immediately.

There has been little research conducted on the first language acquisition of stranding. This paper reports on an experiment which was conducted on the acquisition of pied-piping and stranding to see whether or not one is justified in assuming that markedness necessarily involves a developmental claim. However, before proceeding to a discussion on this experiment, studies which are supportive of the developmental claim will be reviewed.

The developmental view is very common in the acquisition literature and has received a lot of empirical support. For example, studies conducted on the first language acquisition of datives suggest that there is a real-time sequence consistent with "developmental" markedness predictions. Fischer (1971), Cook (1976), and Krause and Goodluck (1983) have all shown that children acquire the unmarked dative construction (as in (3) below) before the marked double object construction (as in (4) below).

3a Ceoff read a book to Gary.
b. George sent a present to Shirley.

4a. Geoff read Gary a book.
b. George sent Shirley a present.

In fact, these studies show that children around the age of three years perform very poorly in tests on the comprehension of the marked dative construction, whereas their success rate is very high on the comprehension of the unmarked dative structure. Roeper et. al. (1981) have also found that in general children have difficulty with the double object construction.

For certain structures, then, children seem to proceed developmentally from unmarked to marked. To the best of my knowledge, no acquisition study has obtained results which suggest that marked constructions will not necessarily emerge later than unmarked constructions.

3. Experiment on Pied-piping and Stranding

3.1 Subjects

33 children from the daycare centre at McGill University in Montreal were tested on their comprehension and production of pied-piping and stranding. These subjects were divided into 3 age groups: age five group (5.6 (years, months) to 4.7), age four group (4.5 to 3.9), and age three group (3.5 to 2.11). A pretest established that each child included in the results understood the verbs, prepositions, and relative clause construction used in the test. 5 children were eliminated from the sample because of their low success rate on the pretest. Of the 28 children included in the results, 13 were bilingual and 15 were

monolingual. 10 five year olds, 9 four year olds, and 9 three year olds successfully completed the comprehension task. For the production task, 10 five year olds, 5 four year olds, and 3 three year olds were included in the results. 4 of the four year olds and 6 of the three year olds were excluded because they failed to understand the nature of the task. They attempted to answer the questions rather than imitate them.

3.2 Comprehension Test

The total number of test sentences for the comprehension test was 24 (12 pied-piping and 12 stranding) and these were divided into two sets so as not to make the task too long for each child. Each child was assigned either to Set A or to Set B; both sets consisted of 6 pied-piping and 6 stranding constructions. These two sets are provided in the Appendix. Before giving each child a test sentence the experimenter acted out two interpretations of that sentence: two interpretations made possible on the assumption that the child may or may not interpret the preposition. For example, before giving the test sentence (1) in Set A "Show me the box which the boy hides in", or (1) in Set B "Show me the box in which the boy hides", the experimenter acted out a boy hiding in a box and a boy hiding a different box, on the assumption that which box the child chose would reflect whether or not he was analysing the prepositional phrase. Therefore, it was crucial that each test sentence made sense both with and without the preposition. If the child chose the box which the boy hid, then it was assumed that he ignored

the preposition. If he pointed to the box in which the boy hid, then it was assumed that he interpreted the prepositional phrase <1>. If stranding is late to emerge, then there might be a tendency for the children to ignore the preposition more often in the stranded versions of the test sentences. The actions derived from the preposition and prepositionless interpretations were randomized for the 12 sentences in order to eliminate the possible effect of children consistently choosing the last option.

Not only could each sentence have 2 interprtetations, but each verb used could take different prepositions and therefore the meaning of the sentence changed according to which preposition was used. By doing this the child could not guess the meaning of the preposition on the basis of familiarity with a common verb-preposition sequence. The distribution of verbs with prepositions is shown in Table 1, where omissions indicate that the preposition was eliminated for that verb.

Verbs	in	on	under	behind
hide	in	--	under	behind
eat	--	on	under	behind
move	in	on	under	------
paint	in	on	-----	behind

TABLE 1. Distribution of Verbs with Prepositions for Comprehension Test.

Also, each verb-preposition combination occurred in both a pied-piped and stranded version of the same sentence, with the pied-piped version occurring in one Set and the stranded version of the same sentence occurring in the other Set. In each Set the sentences were randomized.

3.3 Production Test

It has been argued that children do not imitate that which is beyond their current grammar (Fraser et. al., 1963). The study reported in this paper employed an imitation task to collect data on the children's production of pied-piping and stranding.

For the production test a total of 12 sentences were divided into two sets. Each set consisted of 3 pied-piping and 3 stranding constructions which each child was required to imitate. These two sets are given in the Appendix. Sets A and B were distributed randomly amongst the children and each child received either Set A or Set B. Like the comprehension test, neither set included both a pied-piped and stranded version of the same sentence. The distribution of verbs with prepositions for the imitation task is shown in Table 2, where omissions mean that the preposition was not selected for that verb.

Verbs	in	on	under	behind
hide	in	--	-----	behind
sit	--	on	-----	------
walk	--	--	under	------
jump	in	--	-----	------
run	--	--	under	------

TABLE 2. Distribution of Verbs with Prepositions for Production Test.

The production data was recorded on a portable cassette recorder. This task was usually done immediately after the comprehension test; if not, it was administered during a later session on the same day.

4. Results and Discussion

A series of ANOVA tests, post-hoc ANOVA tests (Scheffe), some Chi-squre tests, as well as t-tests (level of significance, $p < .05$) were run on the results to see if there were significant differences between the comprehension of pied-piping and stranding in each age group and to see if there were significant differences for each structure across age groups. The production results were analysed in the same way.

The overall trend in the comprehension results suggests that the children have mastered both constructions. All children seem to have an equal understanding of pied-piping and stranding since they had a success rate of 68% on the comprehension of both structures. Table 3 below presents the results broken down into age groups.

Structure	Age 3 (n=9)	Age 4 (n=9)	Age 5 (n=10)
Pied-piping(n=6)	70.0%	72.0%	63.0%
Stranding(n=6)	60.88%	68.11%	76.40%

TABLE 3. Comprehension Test: Percentage Correct by Age Group.

The difference between pied-piping and stranding for each of the age groups is not significant, as shown by t-tests. The fact that the two youngest groups do not show a preference to pied-piping in the comprehension test provides some evidence that the developmental claim is too strong.

The results were also analysed to see if age had a significant effect on the comprehension of either pied-piping or

stranding. Scheffe tests reveal that there were no significant differences between the age groups on the comprehension of pied-piping, suggesting that all groups have an equal understanding of this construction. One would expect there to be a significant increase (across age) in the comprehension of stranding if the results were to support the hypothesis that stranding is acquired late. This may appear to be the case when one looks at the data. A Chi-square test reveals no significant difference in the comprehension of stranding across the three age groups, suggesting that stranding is not late to emerge. Since there is no significant difference in the comprehension of stranding between the three and four year olds, the four and five year olds, or between the three and five year olds, then there appears to be no relation between an increase in age and a significant improvement in the comprehension of stranding. If we were to support the claim that young children acquire marked forms late, then we might expect the three year olds' comprehension of stranding to be much poorer than it actually is. In fact, they have a success rate of 60% on the comprehension task, therefore showing some understanding of stranding rather than little or none at all. It seems that the comprehension results of each age group as well as the cross-group results do not support the claim that pied-piping (as an unmarked structure) is realized before stranding in the grammars of young children.

In addition, t-tests were conducted to see if mother tongue (L1) had a significant effect on the percentage of correct responses to pied-piping and stranding. If L1 had an effect, then we might expect to see the bilingual group do better on pied-piping. Because the L1s of most of these speakers contain

pied-piping and not stranding, interference from L1 could facilitate the comprehension of pied-piping. There was no significant difference between the bilingual group and the monolingual group on the comprehension of either structure, which would indicate that the bilingual group did not understand either structure better than the monolinguals. Thus, it appears that L1 had no significant effect.

As shown by an ANOVA test, the overall results of the production test indicate a significantly higher success rate on the production of stranding as compared to the production of pied-piping ($f = 16.16$, $df(1,30)$, $p < .01$), further suggesting that the developmental claim is not supported. The 18 children who completed the imitation task scored 29% correct on the production of pied-piping and 55% on the production of stranded constructions. Table 4 below shows the age group breakdown of these overall results.

Structure	Age 3 (n=3)	Age 4 (n=5)	Age 5 (n=10)
Pied-piping(n=3)	11.0%	18.33%	56.40%
Stranding(n=3)	25.77%	44.22%	93.20%

TABLE 4. Production Test: Percentage Correct Imitations by Age Group.

We might expect the youngest groups to produce pied-piping better than stranding if the developmental hypothesis were correct. However, the results of t-tests indicate that the three year old group shows no significant difference between the production of pied-piping and stranding. Likewise, the four year olds show no significant difference in their production of the two structures.

As shown by a t-test, the five year olds produce stranding significantly better than pied-piping ($p < .007$). Again, the developmental prediction that young children should have the unmarked structure in their grammars prior to the acquisition of the marked construction is not borne out in the results.

The trend in the production results may, at first sight, appear to support the developmental claim as there is an improvement in stranding across age groups, unlike what was found for the comprehension data. Though it is true of the production data, it is equally true for the production of pied-piping, suggesting general improvement in imitation abilities, or in the production of prepositional phrases, rather than anything specific to the marked structure. In addition, Scheffe tests on the production results reveal no significant difference between the three and fours, the fours and fives, nor between the three and five year olds, supporting the hypothesis that stranding is not necessarily late to emerge.

However, even though the three and four year olds do not differ significantly on the production of pied-piping nor on the production of stranding, there is data from only 3 three year olds and thus, it is difficult to present conclusive arguments. Nevertheless, the overall trend on the group results is that stranding is produced significantly better than pied-piping. The results do not suggest that pied-piping has emerged before stranding, so that, as with the comprehension results, the production results do not appear to support the developmental claim.

T-tests were run to see if the bilinguals produced either structure better than the monolinguals. The bilinguals produced

pied-piping significantly better than the monolinguals ($p < .028$) and they produced stranding significantly better than the monolinguals ($p < .016$). This may be due to the fact that bilinguals are better than monolinguals at language-related tasks in general (Peal and Lambert, 1962).

5. Conclusion

We can conclude that the results of this experiment indicate that the children have not ignored available positive evidence, contrary to the developmental claim. That the children seem to have both structures suggests that the necessary triggering experience in the input has established the unmarked and marked constructions in the children's grammars. In addition, the results do not show a significant developmental pattern from unmarked to marked, thereby challenging the predictions made by the developmental claim <2>. The hypothesis that pied-piping, as an unmarked construction, is to be initially adopted in advance of linguistic experience cannot be supported.

There is other work in the literature which suggests that children do not acquire pied-piping before stranding. In a recent study on dative relatives, Goodluck and Gallucci (1984) show that 48 four to seven year olds understand stranded constructions in dative relatives better than pied-piped constructions in dative relatives. The children tested scored 37% correct on the comprehension of stranding and 24% correct on the comprehension of pied-piping. These results are supportive of the general trend in the study reported here; that is,

pied-piping does not necessarily emerge before stranding. The generally lower scores are attributable to the complexity of the dative relative structures used in their testing.

One consequence of these results is that we need a theory which permits us to account for the simultaneous acquisition of unmarked and marked constructions, something which is not predicted by the developmental approach to markedness because it assumes that unmarked structures are necessarily acquired prior to the acquisition of marked structures. The learnability conception of markedness does allow for the simultaneous emergence of pied-piping and stranding since it is neutral with respect to real-time. This raises the question of how to deal with studies, such as the datives, which appear to be supportive of the developmental hypothesis. If markedness is not necessarily involved in accounting for real-time sequences, there may be alternative explanations for why children seem to proceed developmentally in the acquisition of certain structures, explanations which may have nothing to do with the theory of markedness. As noted by Pinker (1984), the difficulty children seem to have with the marked dative construction may be related to the animacy of the indirect and direct objects. He states:

> "However, here the results must be interpreted with caution, since the observed difficulty of the double-object datives in these experiments interacts strongly with the animacy of the indirect and direct objects, and since a number of parsing and tesk-specific strategies could lead to double-object forms being difficult to parse regardless of the ease of initially learning their lexical forms" (Pinker, 1984, p. 398).

Therefore, whilst the lack of a sequence from unmarked to marked

in the acquisition of stranding is inconsistent with the developmental hypothesis, the finding of acquisition sequences for certain structures like the dative constructions is not problematic for the learnability hypothesis, in conjunction with factors of the kind raised by Pinker (1984).

Footnotes

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<1> Throughout this paper, the pronouns he, his, and him will be used generally for the sake of consistency and are used to refer to both the female and male gender.

<2> The devlopmental hypothesis is not specific about when the marked form should emerge. It may be that the marked form emerges in the speech of children who are younger than those tested in this sample. That is, we cannot eliminate the possibility that a developmental sequence from unmarked to marked occurs before the age of three years. If this is the case, then because the data reported here does not include an adequate sample of children below the age of three years, th developmental claim can neither be supported nor rejected. However, the testing of children below the age of three may be problematic. Since most of the three and four year olds in this sample did not understand the imitation task, then children below the age of three may also have problems with this task.

APPENDIX

COMPREHENSION TEST

SET A

1. Show me the box which the boy hides in.
2. Show me the box on which the bear eats.
3. Show me the chair behind which the lion paints.
4. Show me the table which the bear moves under.
5. Show me the box on which the boy paints.
6. Show me the box which the dinosaur eats behind.
7. Show me the box in which the boy moves.
8. Show me the chair which the dog hides under.
9. Show me the table on which the pig moves.
10. Show me the box which the boy paints in.
11. Show me the table which the dinosaur eats under.
12. Show me the chair behind which the lion paints.

Set B

1. Show me the box in which the boy hides.
2. Show me the box which the bear eats on.
3. Show me the chair which the lion paints behind.
4. Show me the table under which the bear moves.
5. Show me the box which the boy paints on.
6. Show me the box behind which the dinosaur eats.
7. Show me the box which the boy moves in.
8. Show me the chair under which the dog hides.
9. Show me the table which the pig moves on.
10. Show me the box in which the boy paints.
11. Show me the table under which the dinosaur eats.
12. Show me the chair which the lion paints behind.

PRODUCTION TEST

SET A

1. What is the cat hiding in?
2. On what is the girl sitting?
3. What is the dog walking under?
4. In what is the boy jumping?
5. Behind what is the mouse hiding?
6. What is the horse running under?

SET B

1. In what is the cat hiding?
2. What is the girl sitting on?
3. Under what is the dog walking?
4. What is the boy jumping in?
5. What is the mouse hiding behind?
6. Under what is the horse running?

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